



TITLE:

Lipid mediators in allergy: Link between human and animal models

AUTHOR(S):

Kabashima, Kenji; Izuhara, Kenji

CITATION:

Kabashima, Kenji ...[et al]. Lipid mediators in allergy: Link between human and animal models. Allergology international 2015, 64(1): 2-3

ISSUE DATE:

2015-01

URL:

<http://hdl.handle.net/2433/216496>

RIGHT:

© 2014, Japanese Society of Allergology. Production and hosting by Elsevier B.V. Under a Creative Commons license.



Contents lists available at ScienceDirect

Allergology International

journal homepage: <http://www.elsevier.com/locate/alit>



Editorial

Lipid mediators in allergy: Link between human and animal models



We have changed the design of the website and of the printed version of *Allergology International* with this issue, Vol. 64, No. 1, according to the start of production and hosting by Elsevier B.V. We believe that our readers will find the new design to be more attractive and informative. In the present issue, we offer a set of review articles entitled “Lipid Mediators in Allergy: Link between Human and Animal Models” that focuses on our goal of understanding the role of lipid mediators in allergy, as well as original articles and letters to the editor. Additionally, Professor Taniguchi has written an obituary for Prof. Kazuo Akiyama, who passed away on November 3rd of this year.¹ Prof. Akiyama served as the president of the Japanese Society of Allergology from 2009 to 2013. He was the authority on research on bronchial asthma induced by fungus such as *Candida albicans* and *Aspergillus* and also contributed to the epidemiology of adult asthma in Japan. His death is a great loss to those who knew him and to all of us working in this field.

Allergy is regulated by a variety of mediators, such as cytokines. Lipid mediators, important modulators in allergy, exert their physiological functions by acting on their own G protein-coupled receptors. Phospholipase (PL)A2 is a group of enzymes that hydrolyze phospholipids to release fatty acids and lysophospholipids, which serve as precursors for lipid mediators. Among the PLA2 superfamily, secreted PLA2 (sPLA2) enzymes comprise the largest subfamily, including 11 isoforms. Individual sPLA2 enzymes exhibit unique tissue and cellular localizations and specific enzymatic properties. Recent studies using transgenic and knockout mice for individual sPLA2 isoforms have revealed their involvement in various pathophysiological functions.² Drs. Murakami and Taketomi survey the updates on sPLA2s, especially their roles in mast cells in allergy.³

Prostanoids, which include prostaglandin (PG) and thromboxane, are metabolites of arachidonic acid through the action of PLA2 released by various stimuli.⁴ The balance between the production of each prostanoid and the expression of its receptors is important for maintaining homeostasis and in the development of pathological conditions, such as allergy.^{5,6} Dr. Honda and others review the recent findings on the roles of prostanoids in allergy, especially focusing on atopic dermatitis and asthma.⁷

Leukotrienes (LTs), including LTB4 and the cysteinyl LTs (CysLTs), LTC4, LTD4 and LTE4, are generated from arachidonic acid. LTB4 is a potent chemoattractant for leukocytes,^{8,9} whereas CysLTs are bronchoconstrictors.¹⁰ LTs play a central role in the pathogenesis of asthma and many other inflammatory diseases.^{11,12} Drs. Liu and

Yokomizo update us on the synthesis, biological function, and relevance of LTs to the pathobiology of allergic diseases.¹³

On the other hand, omega-3 fatty acids, docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), are found naturally in fish oil and are considered to be anti-inflammatory nutrients, with protective effects in inflammatory diseases, including asthma and allergy.¹⁴ Specialized pro-resolving mediators (protectins, resolvins, and maresins) are generated from omega-3 fatty acids, which counter-regulate airway eosinophilic inflammation and promote the resolution of inflammation *in vivo*.¹⁵ In this issue, Drs. Miyata and Arita focus on omega-3 fatty acids and offer recent insights into their bioactive metabolites, including resolvins and protectins.¹⁶

Because most lipid mediators are not chemical stable, they act locally. Therefore, lipid mediators can be good therapeutic targets with limited side effects. In fact, lipid mediators, including non-inflammatory anti-inflammatory drugs, PGE2, PGI2, thromboxane A2, CysLTs, and EPA, are already clinically available. For this issue, pioneers and experts in this field were chosen to write updates on lipid mediators in allergy, which may lead to links between human and animal models. We hope that the readers of this issue will appreciate the value of looking at the pathogenesis of allergy from the perspective of animal models and clinical relevance, and the idea that allergy can be controlled in the future by modulating lipid mediators.

Among the contributors to this issue, Tsukuya et al. validate a COPD screening questionnaire, Population Screener (COPD-PS), as an efficient screening method for COPD, based on the Hisayama study, a famous epidemiological study in Japan.¹⁷ The prevalence of COPD is high worldwide, though it is a preventable and treatable disease. Therefore, some simple screening system to identify COPD subjects would be quite valuable. Several questionnaire systems (e.g., by the IPAG guidelines), including COPD-PS, are available. Although the validity of COPD-PS has already been established in the US, it has yet not been done in Japan. This is the first study aimed at validating COPD-PS in Japan, targeting 2357 subjects.

Minami et al. evaluate the diagnostic usefulness of measuring serum IgE responding to Der p 1 and Der p 2 for house dust mite (HDM)-specific reactivity in asthma patients.¹⁸ Crude mite extract is used to measure serum-specific IgE and in skin prick tests as standard tests for allergy diagnosis; however, since crude extract contains various components, cross-reactivity independent of HDM-reactivity becomes problematic. The ability of serum IgE to discriminate HDM-specific reactivity was greater in Der p 1 and Der p 2 than was crude mite extract. This suggests the usefulness

Peer review under responsibility of Japanese Society of Allergology.

<http://dx.doi.org/10.1016/j.alit.2014.12.002>

1323-8930/Copyright © 2014, Japanese Society of Allergology. Production and hosting by Elsevier B.V. All rights reserved.

of this component of major mite proteins in diagnostic assays for HDM reactivity.

We offer our appreciation to all the authors for their contributions to the present issue of *Allergology International*.

Conflict of interest

The authors have no conflict of interest to declare.

Kenji Kabashima, Associate Editor, *Allergology International*^a,
Kenji Izuhara, Editor-in-Chief, *Allergology International*^{b,*}

^a Department of Dermatology, Kyoto University Graduate School of Medicine, Kyoto, Japan

^b Division of Medical Biochemistry, Department of Biomolecular Sciences, Saga Medical School, Saga, Japan

* Corresponding author. Division of Medical Biochemistry, Department of Biomolecular Sciences, Saga Medical School, 5-1-1, Nabeshima, Saga 849-8501, Japan.

E-mail address: kizuhara@cc.saga-u.ac.jp (K. Izuhara).

References

1. Taniguchi M. Commemorating the passing of Prof. Kazuo Akiyama. *Allergol Int* 2015;**64**:1. <http://dx.doi.org/10.1016/j.alit.2014.12.003>.
2. Murakami M, Lambeau G. Emerging roles of secreted phospholipase A(2) enzymes: an update. *Biochimie* 2013;**95**:43–50.
3. Murakami M, Taketomi Y. Secreted phospholipase A₂ and mast cells. *Allergol Int* 2015;**64**:4–10. <http://dx.doi.org/10.1016/j.alit.2014.07.005>.
4. Hirata T, Narumiya S. Prostanoids as regulators of innate and adaptive immunity. *Adv Immunol* 2012;**116**:143–74.
5. Kabashima K, Miyachi Y. Prostanoids in the cutaneous immune response. *J Dermatol Sci* 2004;**34**:177–84.
6. Honda T, Tokura Y, Miyachi Y, Kabashima K. Prostanoid receptors as possible targets for anti-allergic drugs: recent advances in prostanoids on allergy and immunology. *Curr Drug Targets* 2010;**11**:1605–13.
7. Honda T, Kabashima K. Prostanoids in allergy. *Allergol Int* 2014. <http://dx.doi.org/10.1016/j.alit.2014.08.002>.
8. Yokomizo T, Izumi T, Shimizu T. Leukotriene B₄: metabolism and signal transduction. *Arch Biochem Biophys* 2001;**385**:231–41.
9. Luster AD, Tager AM. T-cell trafficking in asthma: lipid mediators grease the way. *Nat Rev Immunol* 2004;**4**:711–24.
10. Theron AJ, Steel HC, Tintinger GR, Gravett CM, Anderson R, Feldman C. Cysteinyl leukotriene receptor-1 antagonists as modulators of innate immune cell function. *J Immunol Res* 2014;**2014**:608930.
11. Honda T, Kabashima K. Leukotrienes as key mediators and amplifiers in allergic inflammation: insights from the bench and clinic. *Exp Dermatol* 2014;**23**:95–6.
12. Yokomizo T. Leukotriene B₄ receptors: novel roles in immunological regulations. *Adv Enzyme Regul* 2011;**51**:59–64.
13. Liu M, Yokomizo T. The role of leukotrienes in allergic diseases. *Allergol Int* 2015;**64**:17–26. <http://dx.doi.org/10.1016/j.alit.2014.09.001>.
14. Arita M. Mediator lipidomics in acute inflammation and resolution. *J Biochem* 2012;**152**:313–9.
15. Isobe Y, Kato T, Arita M. Emerging roles of eosinophils and eosinophil-derived lipid mediators in the resolution of inflammation. *Front Immunol* 2012;**3**:270.
16. Miyata J, Arita M. Role of omega-3 fatty acids and their metabolites in asthma and allergic diseases. *Allergol Int* 2015;**64**:27–34. <http://dx.doi.org/10.1016/j.alit.2014.08.003>.
17. Tsukuya G, Matsumoto K, Fukuyama S, Crawford B, Nakanishi Y, Ichinose M, et al., and Hisayama Pulmonary Physiology Study Group. Validation of a COPD screening questionnaire and establishment of diagnostic cut-points in a Japanese general population: the Hisayama study. *Allergol Int* 2015;**64**:49–53. <http://dx.doi.org/10.1016/j.alit.2014.06.002>.
18. Minami T, Fukutomi Y, Lidholm J, Yasueda H, Saito A, Sekiya K, et al. IgE Abs to Der p 1 and Der p 2 as diagnostic markers of house dust mite allergy as defined by a bronchoprovocation test. *Allergol Int* 2015;**64**:90–5. <http://dx.doi.org/10.1016/j.alit.2014.08.004>.

Received 20 November 2014